

AMENDMENT TO THE CLAIMS:

This listing of the claims replaces all prior versions, and listings, of claims in the application.

1 1. (previously presented) A method for creating a multidimensional morphological
2 reconstruction of biological tissue data characterizing biological tissue comprising the steps of:
3 cutting histologically thin sections of said biological tissue to produce first
4 and second sets of alternating serial sections of said biological tissue;
5 mapping image data obtained from the first set of alternating serial sections
6 onto a tissue space coordinate system to construct a multidimensional morphological tissue space
7 matrix of image data of the first set of alternating serial sections;
8 unattendedly micro dissecting each serial section in the second set of
9 alternating serial sections into a set of micro dissected section samples;
10 assigning a unique code to each micro dissected section sample micro
11 dissected from the second set of alternating serial sections to form a set of coded micro dissected
12 section samples, with each unique code indicating tissue space coordinates of each coded micro
13 dissected section sample in the morphological tissue space matrix;
14 analyzing each coded micro dissected section sample to obtain biological data
15 providing information on a plurality of biological characteristics of the coded micro dissected
16 section sample; and
17 spatially mapping the biological data characterizing each coded micro
18 dissected section sample, micro dissected from the second set of alternating serial sections, onto the
19 multidimensional morphological tissue space matrix, constructed from the first set of alternating
20 serial sections and superimposing the biological data of the coded micro dissected section sample
21 upon volume image data indicated by the code assigned to the coded micro dissected section sample.

1 2. (previously presented) The method of claim 1 where said step of analyzing
2 comprises the act of:
3 analyzing an incised section sample utilizing a monoclonal antibody binding to
4 determine levels of proteins and other ligands.

3. (previously presented) The method of claim 1 where said step of analyzing comprises the act of:
analyzing a micro dissected section sample with a micro array to determine levels of mRNA.

4. (previously presented) A method for creating a multidimensional morphological reconstruction of gene expression activity in a biological tissue sample comprising the steps of:
cutting histologically thin sections of said sample to produce first and second sets of alternating serial sample sections;
histologically-staining and coverslipping said first set of serial sample sections for light microscopy;
constructing a multidimensional morphological spatial matrix of image data from the first set of histologically-stained serial sample sections;
mounting and covering the second set of serial sample sections with a micro dissection membrane;
unattendedly micro dissecting each of the second set of serial sample sections into a plurality of micro dissected section samples;
providing a set of coded micro dissected section sample holders, with each coded micro dissected section sample holder having a code indicating a unique tissue space coordinate in the multidimensional morphological spatial matrix of image data;
transferring each micro dissected section sample to a coded micro dissected section sample holder having a code indicating the location of a transferred micro dissected section sample in the multidimensional morphological spatial matrix of image data;
analyzing each coded micro dissected section sample to obtain biological gene expression data;
spatially superimposing gene expression data of a micro dissected section sample onto a spatial coordinate of the multidimensional morphological matrix of image data indicated by the code of the coded micro dissected section sample holder holding the micro dissected section sample.

5. (cancelled)

6. (previously presented) The method of claim 4 further comprising the step of:
generating displays correlating values of biological data with locations in the
3-D (three-dimensional) visualization.

7. (previously presented) A method for creating a multidimensional morphological
reconstruction of biological data characterizing a biological tissue sample comprising the steps of:
cutting histologically thin sections of said biological tissue sample to form a set of
serial sample sections;
constructing a multidimensional morphological spatial matrix of image data from the
set of serial sample sections of said biological tissue sample;
unattendedly micro dissecting each serial section of said biological tissue sample into
a multidimensional spatial matrix of coded micro dissected section samples, with a code assigned to
a coded micro dissected section sample indicating the location of the coded micro dissected section
sample in the multidimensional spatial matrix;
analyzing each coded micro dissected section sample to obtain biological data
characterizing the coded micro dissected section sample; and
linking the biological data characterizing each coded micro dissected section sample
to the location in the multidimensional morphological matrix of image data indicated by the code of
the coded micro dissected section sample.

8. (cancelled)

9. (previously presented) The method of claim 7 where:
each coded micro dissected section sample analyzed is located in a specific
multidimensional volume image data element of the multidimensional morphological spatial matrix
of image data from said biological tissue sample, and where each such coded micro dissected section
sample contains all of the tissue used to produce said volume image data.

10. (previously presented) The method of claim 7 where:
each coded micro dissected section sample analyzed is located in a specific range of
multidimensional volume image data from the multidimensional morphological spatial matrix of
image data from said biological tissue sample.

11. (previously presented) A system for creating a multidimensional morphological reconstruction of biological data characterizing a biological tissue sample comprising:

means for cutting histologically thin sections of said biological tissue sample to form a set of serial sample sections;

means for constructing a multidimensional morphological spatial matrix of image data from the set of serial sample sections of said biological tissue sample;

means for unattendedly micro dissecting each serial section of said biological tissue sample into a multidimensional spatial matrix of coded micro dissected section samples, with a code of a coded micro dissected section sample indicating the location of the coded micro dissected section sample in the multidimensional spatial matrix;

means for analyzing each coded micro dissected section sample to obtain biological data characterizing the coded micro dissected section sample; and

means for linking the biological data characterizing each coded micro dissected section sample to the location in the multidimensional morphological matrix of image data indicated by the code of the coded micro dissected section sample.